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BOOK-REVIEWS.

A Handbook of Engine and Boiler Trials, and of the Indicator and Prony Brake. By R. H. THURSTON. New York, Wiley. 8°. \$5.

THIS work, being virtually the first of its kind, must of necessity fill an important place in the literature of the steam-engine; and the fact that Professor Thurston is the author is sufficient guaranty that it may safely be accepted as a standard of reference while present methods of steam-engine and boiler tests are in vogue. Engineers making tests of this kind have hitherto been compelled to do so without any definite standard of reference; and no generally accepted criterion has been available for the engineer who wished to record the results of engine or boiler trials in an acceptable and permanent manner. The long-existing want of such a criterion has led to a general concurrence among engineers that a system, provisional though it may be, is feasible, according to which both engines and steam-generators may be satisfactorily tested. This system, which is based upon the work of a committee of the American Society of Mechanical Engineers, of their brother engineers in Germany, and of other recognized experts and authorities, is admirably presented in Professor Thurston's work.

This treatise presents, in a concise though clear and easily understood form, those methods of trial of heat-engines which have become standard; exhibits the processes of their application; describes the best forms of apparatus in current use in conducting the trials and in securing the data sought; and illustrates the uses and capabilities of these apparatus. It also presents examples of the reports made by distinguished engineers on important work of this character, and thus gives good examples of the form of such reports, and of the data and results deduced from them in the case of the better classes of machinery and apparatus.

The system of boiler trial described in this work is that proposed by the committee of the American Society of Mechanical Engineers, since become standard in this country, and to a great extent abroad. It is complete and satisfactory, having been found sufficient, so far, to meet every ordinary requirement.

A chapter is devoted to the steam-engine indicator, giving a brief and simple account of that instrument and its capabilities, as well as a description of the usual and best ways of handling it, though no attempt has been made to elaborate to any great extent the study of the diagram. Many forms of diagram, however, are illustrated, and the student is referred to special treatises on the indicator for further information on the subject. A description of the methods usually considered best and most exact in the measurement and computation of the indicator diagram is given in a separate chapter, as well as of the processes leading to the more important of the results attainable by the use of the instrument.

A series of valuable reports, written by able engineers as models of data summaries and of conclusions derived from such summaries, add to the completeness of the work. One example in each of the more important classes of steam-engine is studied in this manner, and any engineer, by a study of the series, should be enabled to secure satisfactory results in making tests, even though previously inexperienced in such work. An appendix contains all needful constants and reference-tables, and an abundance of illustrations adds much to the clearness and value of the text.

The Origin of the Aryans. By ISAAC TAYLOR. (Contemporary Science Series). New York, Scribner. 12°. \$1.25.

THIS is an able and interesting book, the object of which is to give the latest results of the controversy concerning the origin of the Aryan races. It opens with a chapter on the history of the subject, beginning with the assumption of the philologists that the original home of the undivided Aryans was in Central Asia, whence the various branches of the common family migrated to their present seats. This assumption is easily shown to be baseless, and the old theory has now been abandoned by the majority of archæologists. Moreover, it is

now generally held that the greater portion of the population in the countries we now call Aryan really belongs to other families of mankind, and that the widespread prevalence of the Aryan languages is due to conquest by Aryan peoples. The evidence of this is mainly anthropological, and its presentation occupies a considerable portion of Mr. Taylor's book. He repeats the various arguments that have been adduced to prove that the original home of the Aryans was in Europe, which he regards as conclusive. But the question then arises as to which of the prehistoric races of Europe is to be regarded as the original Aryan stock. On so difficult and so unsettled a question we shall not here offer any opinion, but will briefly indicate the evidence and the arguments that have thus far been adduced.

The skulls and other remains of the neolithic age point pretty clearly to the fact that at that time the greater part of Europe was peopled by four distinct races,—the Iberians in Spain, Britain, and some other places; the Ligurians in central France; the Celto-Slavic race in central Europe; and the Teutons, or Scandinavians, in the north. Of these, the Iberians seem to be related to the Hamites, and the Ligurians to the Turanian family; so that, if the original home of the Aryans was in Europe, the original Aryan race must be either the Teutonic or the Celto-Slavic. Here, therefore, is now the main point of contention, the German writers generally upholding the claims of the Teutons, and the French those of the Celts. The dispute has been conducted with considerable acrimony and with a rather unseemly exhibition of national feeling on both sides, and is still unsettled. Mr. Taylor inclines in favor of the Celts, but maintains a judicial attitude, and avoids a decisive expression of opinion. He presents the evidence on the whole subject, however, at considerable length, and the clearness of his style makes it intelligible to the reader. Those who wish to know the latest views and arguments on the question will find his book useful.

Laboratory Manual of Experimental Physics. By ALBERT L. AREY. Syracuse, Bardeen. 24°. 75 cents.

THE author of this book is a civil engineer by profession, and at present is instructor in physics at the Rochester Free Academy. The aim of the book is to describe such experiments as will lead to quantitative work on the part of the student, and the author lays considerable stress on the importance of bringing home to the students the existence of a personal error in observations, that within limits can be much reduced by using intelligence and care. All simply illustrative experiments are omitted from the book, the author believing, with most teachers in this field, that such can be carried out to the best purpose on the lecture-table.

It is needless to say that the experiments described can be performed with apparatus of the simplest kind, most of it capable of being home-made. Many of them are new, and are sure to be suggestive to those engaged in teaching of this character.

Whether we approve of the alternate blank pages intended for notes supplementing the text, we can hardly say; yet that these notes will be well entered by some is very true, and for such the benefit of forming a habit of noting down points brought out at the time of experimenting will be considerable.

Fort Ancient. By WARREN K. MOOREHEAD. Cincinnati, Robert Clarke & Co. \$2.

MR. MOOREHEAD and a competent staff of assistants spent the season of 1889 in making a careful survey of Fort Ancient, the renowned earthwork of Ohio. The results of his investigations have been published in the present volume, which is most beautifully illustrated with excellent photo-engravings, which greatly enhance its value. From his extended researches the author draws the following inferences: Fort Ancient is a defensive earthwork, used at times as a refuge by some large tribe of Indians, and at times there was a large village situated within its walls. The fields within the wall, especially in the enclosure of the old fort, are covered with pottery fragments, bones, arrow-heads, and flint chips. The ground has many